

---

**ALEXEY SHEVYAKOV**, University of Saskatchewan

*Analytical Properties of Nonlinear Partial Differential Equations in Fluid Dynamics and Beyond*

Analytical properties of partial differential equations (PDEs), in particular, models that arise in physics, engineering, and other applications, provide a fundamental counterpart to numerical solutions. Analytical methods for nonlinear PDEs have been under active development over the last hundred years; they include notions of S- and C-integrability and applications thereof, multiple other notions of integrability, Lagrangian and Hamiltonian structures, Painleve property, symmetries, conservation laws, reductions and exact solutions including solitons, and more.

In this talk we will look at some reductions of general fluid dynamics equations, including popular and less well known shallow water PDE models. Such models arise in a wide variety of settings within and beyond fluid surface waves. We will discuss some important analytical properties of such models with emphasis on those that are systematically computable. Examples of computation and applications of elements of analytical structure will be given for several PDE systems.